User Manual

Connection to INTERBUS MMICOM Interface 02, 10, 15, 23, 71, 78

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SÜTRON ELECTRONIC GMBH

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1	26.07.2005	First edition
2	24.11.2005	Interfaces 71 and 78 added, Validation extended, chapter "Important Notes" added

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1 Important Notes

1.1 Symbols

The symbols in this manual are used to draw your attention on notes and dangers.

Danger
This symbol is used to refer to instructions wich, if ignored or not carfully followed could result in personal injury.

Note
This symbol indicates application tips or supplementary notes.

Reference to source of information
This symbol refers to detailed sources of information on the current topic.

1.2 Safety Notes

- Read this manual carefully before using the operating device. Keep this manual in a place where it is always accessible to all users.
- Proper transportation, handling and storage, placement and installation of this product are prerequisites for its subsequent flawless and safe operation.
- This user manual contains the most important information for the safe operation of the device.
- The user manual, in particular the safety notes, must be observed by all personnel working with the device.
- Observe the accident prevention rules and regulations that apply to the operating site.
- Installation and operation must only be carried out by qualified and trained personnel.

1.3 Intended Use

- The device is designed for use in the industry.
- The device is state-of-the art and has been built to the latest standard safety requirements. However, dangerous situations or damage to the machine itself or other property can arise from the use of this device.
- The device fulfills the requirements of the EMC directives and harmonized European standards. Any modifications to the system can influence the EMC behavior.

1.4 Target Group

All configuration and programming work in connection with the automation system must be performed by trained personnel only (e.g. qualified electricians, electrical engineers).

The configuration and programming personnel must be familiar with the safety concepts of automation technology.

2 INTERBUS MMICOM Interface 02, 10, 15, 23, 71, 78

To select the correct interface variant in the programming software, take note of the ID on the label attached to the operating device.

The two digits after the slash indicate the interface variant (printed in bold in the example displayed below).

For example:

TP32ET/**15**9032

The **INTERBUS MMICOM Interface 02, 10, 15, 23, 71, 78** protocol allows a communication between an operating device with RS232 interface and an INTERBUS Master. For this purpose, a BK06 or BK07 bus node which uses the MMICOM protocol is inserted. The bus node is connected to the operating device by a RS232c interface and to the INTERBUS structure by an optical fiber cable (BK06) or an copper cable (BK07).

The serial register extension SRE is used for the communication. This makes it possible to exchange 8 bytes of user data through the INTERBUS.

The bus node identifies itself to the INTERBUS with variuos ID codes depending on the device variant.

Table 2-1 Device variants

Type	Order Number	Inputs	Outputs	ID-Code
BK06	81151.010	8	8	47
BK06	81151.110	16	8	47
BK06	81151.300	0	0	47
BK06	81151.510	8	8	241
BK06	81151.610	16	8	241
BK07	81200.000	8	8	47
BK07	81200.100	16	8	47
BK07	81200.500	8	8	241
BK07	81200.600	16	8	241

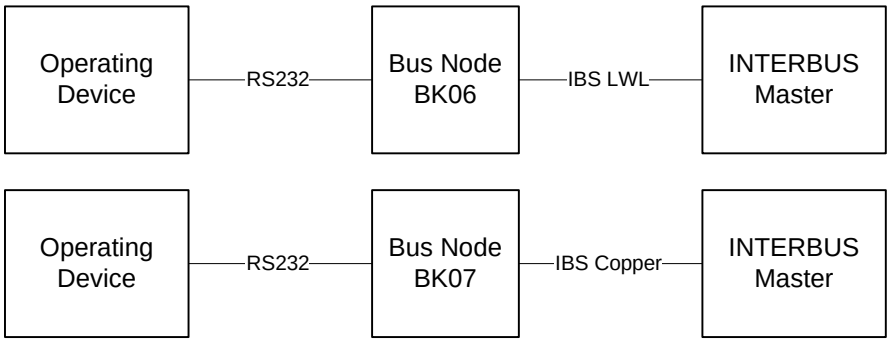


Figure 2-1 Connection of operating device, bus node and INTERBUS

2.1 MMICOM Structure

The MMI structure comprises 5 or 6 words depending on the configuration of the bus node (8 I/O or 16 I/O).

Table 2-2 MMI structure for BK06 with 8 inputs and 8 outputs:

Byte	Content
1	Control Byte
2	PD index
3	Variable high
4	Variable low
5	MMI
6	MMI
7	MMI
8	MMI
9	Copy of control byte
10	Inputs _.0 to _.7 or outputs _.0 to _.7

Table 2-3 MMI structure for BK06 with 16 inputs and 8 outputs

Byte	Content
1	Control Byte
2	PD index
3	Variable high
4	Variable low
5	MMI
6	MMI
7	MMI
8	MMI
9	Copy of control byte
10	Inputs _.0 to _.7 or outputs _.0 to _.7
11	Optional inputs _.8 to _.15
12	Reserved

2.2 Data Types

The data types specify how many bytes are assigned to a single variable.

Table 2-4 Data types for INTERBUS BK06

Data type	Access to	Length of Single Variable	Comment
BY	Byte (and Bit also)	1 Byte	Next byte is located 1 address higher
W	Word	2 Bytes	Next word is located 1 address higher
W-2	Word	2 Bytes	Next word is located 2 addresses higher
DW	Double Word	4 Bytes	Next double word is located 1 address higher
DW-2	Double Word	4 Bytes	Next double word is located 2 addresses higher
DW-4	Double Word	4 Bytes	Next double word is located 4 addresses higher

The following convention applies to data with a data length of more than 4 bytes (for example, alphanumeric texts, tables, polling area, status messages):
Depending on the access type, the data is processed with the corresponding one-, two-, or four-byte access. If there is other data to be processed, it is assumed that this data is located under the next higher variable number in each case.

Example:

A 10-character text string starting at variable 100 (access W - word) consists of variables as follows:

PC WORX = W100 + W101 + W102 + W103 + W104 = 10 byte

Siemens S7 = W100 + W102 + W104 + W106 + W108 = 10 byte

2.3 Considerations for Optimized Data Transmission

The usage of optimized data transmission is not permitted to projects with PC WORX.

To optimize the data transmission and as a result accelerate the speed of screen composition at the operating device you can activate the **Optimized data transmission** in the protocol parameters. In this case the available user data of 4 byte (32 bit) is used more efficient and the number of communication telegrams is reduced. To make this available you have to address the variables consecutively as bit, byte or word access in the corresponding address area.

The following table shows the possible combinations.

Table 2-5 Combinations for optimized data transmission

DB X Offset Y	DB X Offset Y+1	DB X Offset Y+2	DB X Offset Y+3	Number Of Telegrams	
				Wit-hout Optim.	With Optim.
BY				1	1
BY	BY			2	1
BY		BY		2	2
BY			BY	2	1
BY	BY	BY		3	2
BY	BY		BY	3	1
BY		BY	BY	3	1
BY	BY	BY	BY	4	1
W low	W high			1	1
W low	W high	W low	W high	2	1

The syntax for INTERBUS MMICOM is not controller-specific.
Examples for Siemens S7 controllers:
BY 100, 10 = DB100.DBB10,
W 100, 10 = DB100.DBW10,
DW 100, 10 = DB100.DBD10.
Examples for PC WORX:
BY100 = byte array, byte 100,
W100 = word array, word 100,
DW100 = double word array, double word 100

BIT access:

Without optimized data transmission up to 8/16/32 bits, which have the same byte-, word- or double word address, are transmitted together.

With optimized data transmission also bits which are located in consecutively addressed bytes or words are transmitted together.

Table 2-6 BIT access

Bit Variables on one Screen				Number of Bits	Number Of Telegrams	
Variable	Address	Low-Bit No	High-Bit No		Without Optim.	With Optim.
1 : 8	BY 100, 10 : BY 100, 10	0 : 7	0 : 7	8	1	1
1 : 8 9 : 16	BY 100, 10 : BY 100, 10 BY 100, 11 : BY 100, 11	0 : 7 0 : 7	0 : 7 0 : 7	16	2	1
1 : 8 9 : 16 17 : 24 25 : 32	BY 100, 10 : BY 100, 10 BY 100, 11 : BY 100, 11 BY 100, 12 : BY 100, 12 BY 100, 13 : BY 100, 13	0 : 7 0 : 7 0 : 7 0 : 7	0 : 7 0 : 7 0 : 7 0 : 7	32	4	1
1 : 16	W 100, 10 : W 100, 10	0 : 15	0 : 15	16	1	1
1 : 16 17 : 32	W 100, 10 : W 100, 10 W 100, 12 : W 100, 12	0 : 15 0 : 15	0 : 15 0 : 15	32	2	1
1 : 32	DW 100, 10 : DW 100, 10	0 : 31	0 : 31	32	1	1

BYTE access:

Table 2-7 BYTE access

Byte Variables on one Screen	Number of Bytes	Number Of Telegrams	
		Wit-hout Optim.	With Optim.
BY 100, 10	1	1	1
BY 100, 10 + BY 100, 11	2	2	1
BY 100, 10 + BY 100, 12	2	2	2
BY 100, 10 + BY 100, 11 + BY 100, 12	3	3	2
BY 100, 10 + BY 100, 11 + BY 100, 13	3	3	1
BY 100, 10 + BY 100, 11 + BY 100, 12 + BY 100, 13	4	4	1

For 3 consecutive Bytes 2 accesses are made. The first 2 bytes are accessed with one WORD access and the third byte is accessed with a BYTE access. In case of the third byte is at the end of a data block this will not cause a communication error.

WORD access:

Table 2-8 WORD access

Word Variables on one Screen	Number of Words	Number Of Telegrams	
		Wit-hout Optim.	With Optim.
W 100, 10	1	1	1
W 100, 10 + W 100, 12	2	2	1

2.4 Programming

2.4.1 Protocol parameters

With the protocol parameters, you can adapt the communication of the controller used.

The parameters for the communication with the bus node are fixed and cannot be changed.

2.4.1.1 Baud Rate

This parameter specifies the communication rate.

Table 2-9 Baud rate

Configurable Values (Baud)	Default Value
300	
600	
1200	
2400	
4800	
9600	
19200	
38400	X
57600	
76800	
115200	

2.4.1.2 Parity

This parameter specifies the parity used to control the communication.

Table 2-10 Parity

Configurable Values	Default Value
None	X
Even	
Odd	

2.4.1.3 Handshake

This parameter specifies the method used to control the communication.

Table 2-11 Handshake

Configurable values	Default Value
No Handshake	X
Hardware	
Software	

2.4.1.4 Data Bits

This parameter specifies the number of data bits.

Table 2-12 Data bits

Configurable Values	Default Value
5	
6	
7	
8	X

2.4.1.5 Stop Bits

This parameter specifies the number of stop bits.

Table 2-13 Stop bits

Configurable Values	Default Value
1	X
1.5	
2	

2.4.1.6 MMICOM Handshake Timeout

This parameter specifies how long the operating device waits for an acknowledgement from the controller.

Table 2-14 MMICOM handshake timeout

Configurable Values	Default Value
0 ms to 65535 ms	1000 ms

2.4.1.7 Timeout for Response

This parameter specifies how long the operating device waits for a response from the PLC.

Table 2-15 Maximum waiting time for response

Configurable Values	Default Value
0 ms to 65535 ms	1000 ms

2.4.1.8 Delay until Connection Set-Up

This parameter specifies the waiting time after which the operating device starts the communication.

Table 2-16 Delay until connection set-up

Configurable Values	Default Value
0 s to 20 s	2 s

2.4.1.9 Floating Point Numbers in the Siemens Format

This parameter specifies whether floating point numbers are exchanged in the Siemens-specific format or IEEE format.

Table 2-17 Floating point number in the Siemens format

Configurable Values	Default Value
IEEE Format	
Siemens Format	X

2.4.1.10 Optimized Data Transmission

This parameter specifies whether optimized data transmission should be used. For using optimized data transmission it is recommended to fulfill certain considerations while programming the controller!

Table 2-18 Optimized data transmission

Configurable Values	Default Value
ON	
OFF	X

See chapter “Considerations for Optimized Data Transmission“ on page 2-3.

2.4.2 Input Syntax

The following image illustrates the structure of the input syntax for variables in the programming software.

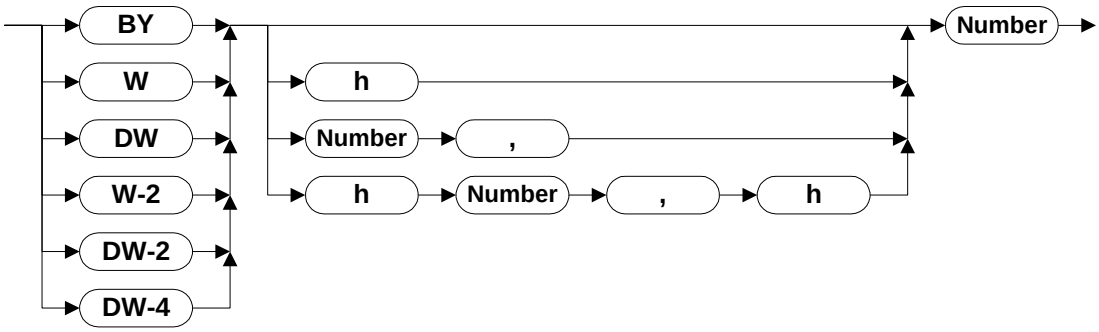


Figure 2-2 Syntax diagram

In the programming software the **Variable** dialog opens, to define a controller variable.

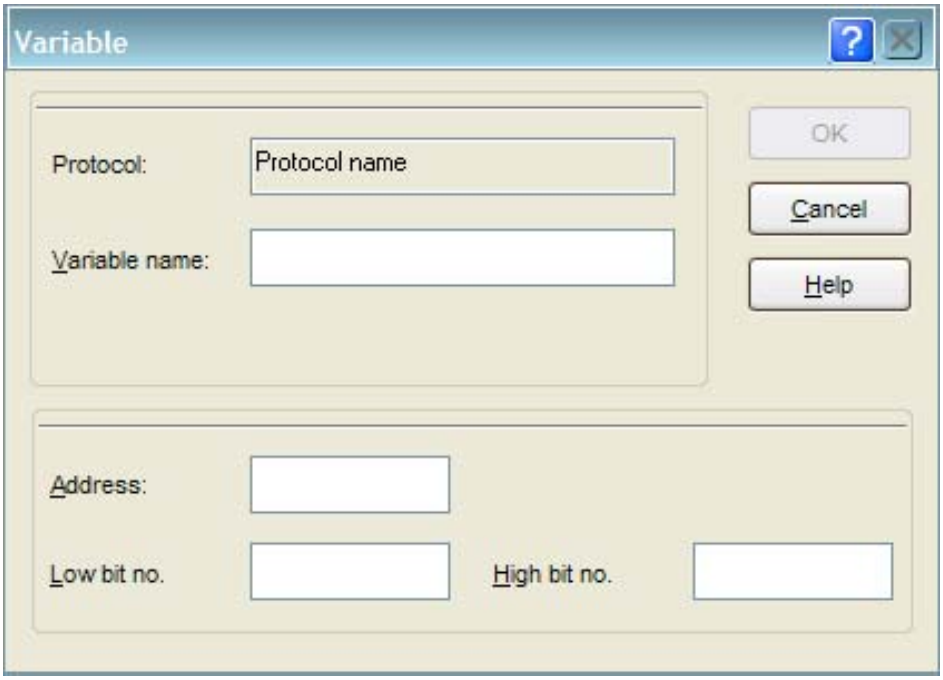


Figure 2-3 Variable dialog

Variable name:

Enter any name for a variable in this field.

Address:

Enter an address according to the syntax diagram above.

Low-Bit No. and High-Bit No.:

If you specify **a single bit** of a byte, word or double word, enter the same bit number in each field.

Example:

To specify the address of the data block 100, byte 10, bit 0 enter the following values.
Address = BY100,10
Low-Bit No. = 0
High-Bit No. = 0

If you specify the address of **several bits** (bitstream) of one byte, word or double word, enter the lower significant bit number in the Low-Bit No. field and the higher significant bit number in the High-Bit No. field.

Example:

To specify the address of the data block 100, byte 10, bits 0 to 3 enter the following values.
Address = BY 100,10
Low-Bit No. = 0
High-Bit No. = 3

The syntax for INTERBUS MMICOM is not controller-specific.
Examples for Siemens S7 controllers:
BY 100, 10 = DB100.DBB10,
W 100, 10 = DB100.DBW10,
DW 100, 10 = DB100.DBD10.
Examples for PC WORX:
BY100 = byte array, byte 100,
W100 = word array, word 100,
DW100 = double word array, double word 100

2.4.3 Physical Connection

Use the RS232 interface to connect an operating device to the bus node BK06.

2.4.3.1 Pin Assignment for Operating Devices with an Universal Interface

Table 2-19 Pin assignment RS232

Pin	Designation	Function
6	TD	Transmitted Data
15	CTS	Clear to send
17	RTS	Request to send
18	RD	Received data
25	SGND	Signal Ground

2.4.3.2 Pin Assignment for Bus Nodes

Table 2-20 Pin assignment RS232

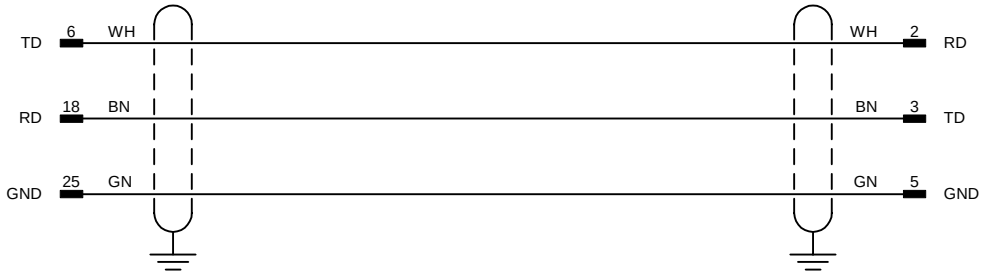
Pin	Designation	Function
1	nc	Not Connected
2	RD	Received Data
3	TD	Transmitted Data
4	nc	Not Connected
5	GND	Ground
6	nc	Not Connected
7	nc	Not Connected
8	nc	Not Connected
9	nc	Not Connected

2.4.3.3 Cable SER1 RS232 - Bus Node BK06

The following cabling diagram applies to operating devices with an universal interface **only**.

Operating Device

Bus Node



D-SUB
Male Connector
25 Pin

D-SUB
Male Connector
9 Pin

2.5 Error Messages

Error messages are displayed on the operating device along with a code and subcode. Error messages are composed as follows:

Communication Error

Code XXXXX

Subcode XXXXX

Retries XXXXX

Table 2-21 Error messages for INTERBUS MMICOM Interface 02, 10, 15, 23, 71, 78

Code	Subcode	Error Type	Possible Cause
2		The controller sent data to the operating device which the operating device did not request.	
4	xx	Timeout error. The subcode specifies the requested variable number.	
40		Illegal system variable.	The project contains an illegal system variable.
50		Malfunction bit not set by controller.	
51		Online bit of controller is not set.	Bus is not running. PLC program is missing or controller is in STOP mode.
52		Standard bit of controller is not set.	Bus is not running. PLC program is missing or controller is in STOP mode.
53	xx	Wrong PD index received. The subcode specifies the PD index received.	

Table 2-21 Error messages for INTERBUS MMICOM Interface 02, 10, 15, 23, 71, 78

Code	Subcode	Error Type	Possible Cause
54		Handshake error (receive timeout).	PLC program missing or controller is in STOP mode.
55		Handshake error (send timeout).	PLC program missing or controller is in STOP mode.
56		Variable has wrong base size.	
57		Handshake error.	Handshake bits were not set correctly by controller.
58		Access error.	No SPI communication possible.
59	xx	Wrong variable number received. The subcode specifies the variable number received.	
60	xx	Wrong PD index received. The subcode specifies the PD index received.	
61		INTERBUS reset interrupt.	An INTERBUS reset interrupt was triggered; the outputs are deactivated.
62		Wrong micro controller program version.	
70		Transmission error	
	0x0B	NAK during disconnect	
	0x0C	NAK during disconnect	
	0x15	QVZ (acknowledgment delay) on connection setup	
	0x17	NAK during disconnect	
	0x19	Both partners have high priority	
71		Receive error	
	0x03	Hardware error	
	0x0F	Receive box blocked	
	0x13	No further repetition	
	0x15	Block delay	
	0x17	Wrong BCC	

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